SUB-SECTION QB PORTABLE SETS

TYPE 30

Date of design:- 1924.

Type 30 is the name used in the Royal Navy for the Army designed Portable Set C Mark I. It is transported on two pneumatic tyred carts which carry respectively:-

1. Transmitter (110), Receiver (111), Aerial gear (112), masts (109), telephones, valves etc., in box (113) and aerial reels, spares etc., in box (114) (See figure j.)
2. An engine driven D.P. generator (6), engine (64), switchboard (65), three 2 volt cells in box (115), oil (116) and petrol (117) (See figure j.)

The cart wheels and axles are made removable and so the carts provide two benches for setting up the station (see figures k. and l.)

Two 15 feet steel masts (109) in 2 feet 8 inch sections are provided to carry a 120 feet single wire aerial. One copper earth mat (107) is supplied and is normally effective. If, however, the station is set up on very dry ground, a further one or two should be extemporised.

Two tents are supplied for shelters for the station and power unit.

TRANSMITTING SET

Frequency range:-	150 - 426 kc/s (with 120 feet aerial).
Power supply:-	Double Purpose Generator. H.T. 1200 volts, L.T. 12 volts.
Valve used:-	AT50.
Associated wavemeter:-	R.A.F. W.3.
Approximate range in miles:-	40 miles.

POWER SUPPLY AND SWITCHBOARD

Normally power is supplied by an engine (64) driven double voltage generator (6) supplying 1200 volts H.T. and 12 volts L.T. The whole unit is mounted (see figure j.) in a guard frame, parts of which act as carrying handles. The engine is a 2¾ H.P. motor cycle engine directly coupled to the generator. The speed is automatically controlled by a governor. In case of engine failure the generator may be used as a rotary transformer if supplied with 12 volts at the terminals (7) on the transmitter, it then gives an output of 80 milliamps D.C. at not less than 850 volts. A separate battery must now be used for the transmitting valve (5) filament. The generator should be placed at least 20 yards from the station to prevent interference in the receiver.

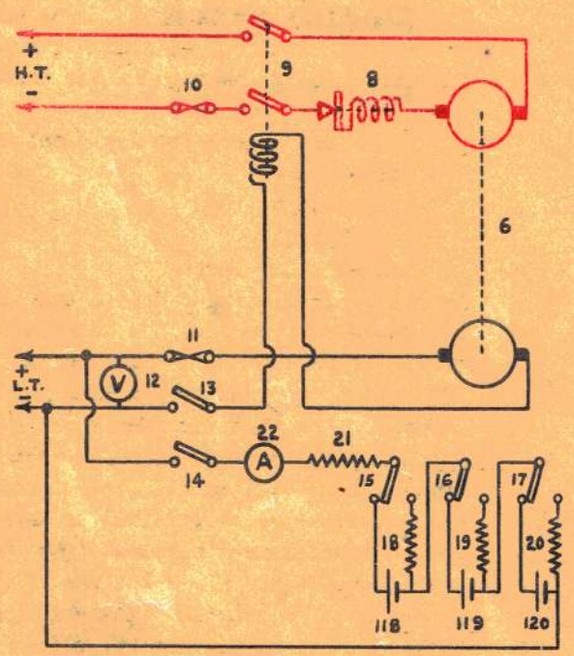


FIG. a.

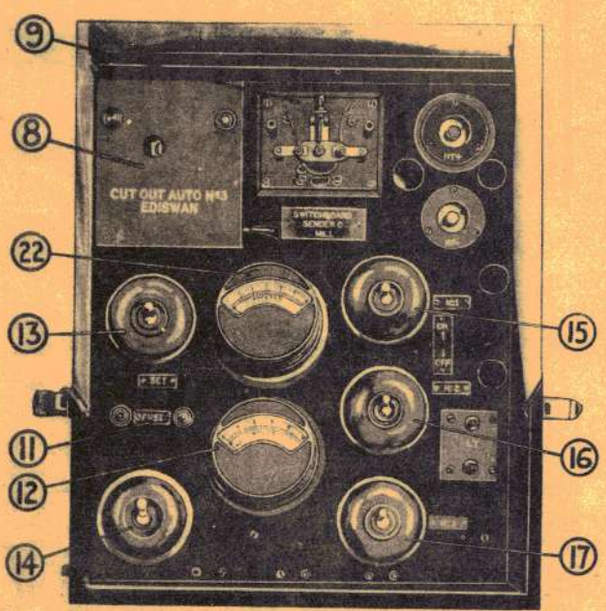


FIG. b.

The supplies are taken to a switchboard (65) which contains an overload coil (8) and a safety relay (9) whose bobbin is in series with the L.T. supply, the contacts forming a break in both H.T. mains. Fuses (10) and (11) are fitted one in H.T. and one in L.T. supply leads. An L.T. voltmeter (12) only is fitted which should read 12 volts when the generator is running; if it does not read correctly, the H.T. voltage will also be wrong and the generator should be readjusted. A switch (13) marked "SET" completes the filament circuit through the bobbin of the relay. The board also contains charging arrangements for three 2 volt accumulators (118)(119)(120) in series. A switch(14)marked "CHARGE" completes the supply which is taken from the L.T. side of the generator. Switches (15)(16)(17)place the accumulator on charge or insert 1.2 ohm resistances(18)(19) and (20) in circuit to compensate for the accumulator resistance and so maintain correct charging current which is 2 amps. A 2.4 ohm resistance (21) is always in circuit. The ammeter(22)indicates the charging current. The charging leads are fitted with special plugs to fit the accumulator boxes.

TYPE 30
TRANSMITTER

QB3

Wave form	Method of producing oscillation	Nature of circuit	Grid excitation	Feed	Aerial excitation	High oscillating potential electrode
C. W.	Self	Tuned circuit between anode and filament.	Mutual inductive.	Series	Direct inductive.	Anode

H. T. Supply. Two 20 yard cables bring the H. T. from the switchboard to the transmitter. A switch (23) completes the circuit to the anode of the valve through an anode choke (38) variometer (36) and part of the aerial coil (35). The signalling key (24) completes the H. T. negative lead. A smoothing condenser (25) of 5 jars is placed across the supply.

Filament Supply. Two 20 yard lengths of special low resistance cable (0.16 ohm per 20 yards) are provided and plug in to the transmitter. The positive supply passes through two blades of the send-receive switch (26); one makes first and inserts a resistance (27) of 0.36 ohm in the circuit to prevent a rush of current causing damage to the valve; on a further movement of the switch the resistance is short circuited by a second blade. The normal valve current is 3 amps. A voltmeter (28) indicates the voltage across the filament which can be adjusted by the rheostat (29) to suit the valve in use but should in no case exceed 8.5 volts.

Oscillatory Circuits. The actual transmitter is contained in a waterproof case. The grid circuit consists of the inductance (30) tuned by a variable 3 jar condenser (31), and a 2 jar grid condenser (32) and a grid leak (33) of 6000 ohms. The coupling to the aerial coil (35) is fixed.

One blade of the send-receive switch (26) connects the aerial through a 3 jar blocking condenser (34), to the aerial tap. The aerial coil (35) is about 4000 mics and has 33 tappings brought to sockets on the face of the transmitter. Similar sockets marked A to E are provided for the anode tap. The aerial tap must not be inserted in these sockets or damage will be caused to the aerial coil (35). A special socket (66) is provided if it is desired to connect aerial and anode to the same point. Fine tuning is carried out on the variometer (36). A direct reading 0.1 amp ammeter (37) is inserted in the earth lead.

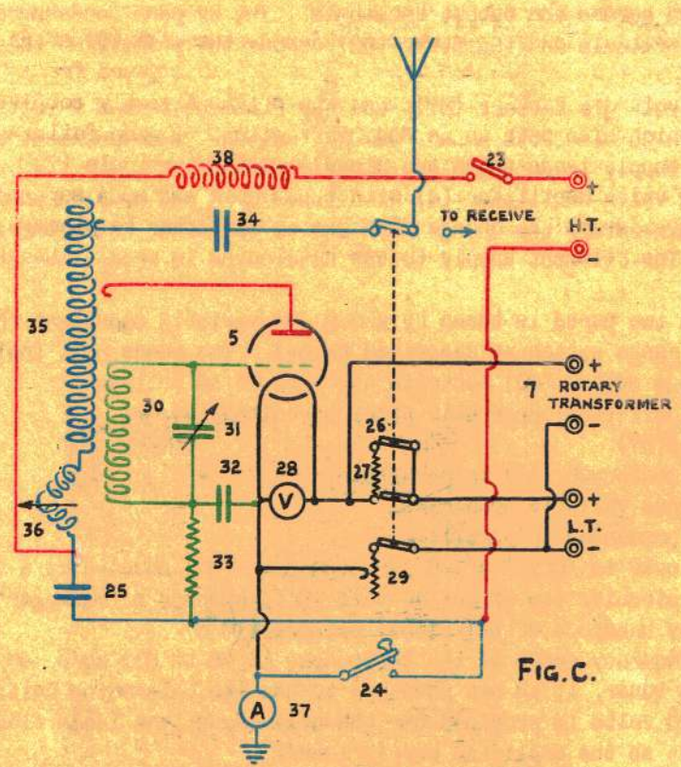


FIG. C.

The signalling key completes the following:-

H. T. negative lead.
Grid Circuit.
Transmitting Earth.

Operation and Tuning. Before starting the generator see that the overload indicator on the switchboard shows "ON". A press push is provided for the purpose. See that the generator is supplying the correct voltage, make the "SET" switch (13) on the control box and send-receive switch (26) to send. Adjust the filament rheostat (29) for correct voltage. Place the aerial and anode plugs in sockets; the table on the cover of transmitter may be used as a guide.

Make H. T. switch (23). Tuning is carried out with a Townsend wavemeter (described in detail on page Y8) which should be placed on the top right hand side of the transmitter with the dial in front. Press the key, vary the grid condenser and adjust the anode tap for maximum radiation, measure the wave on the wavemeter and adjust as necessary to wave frequency required.

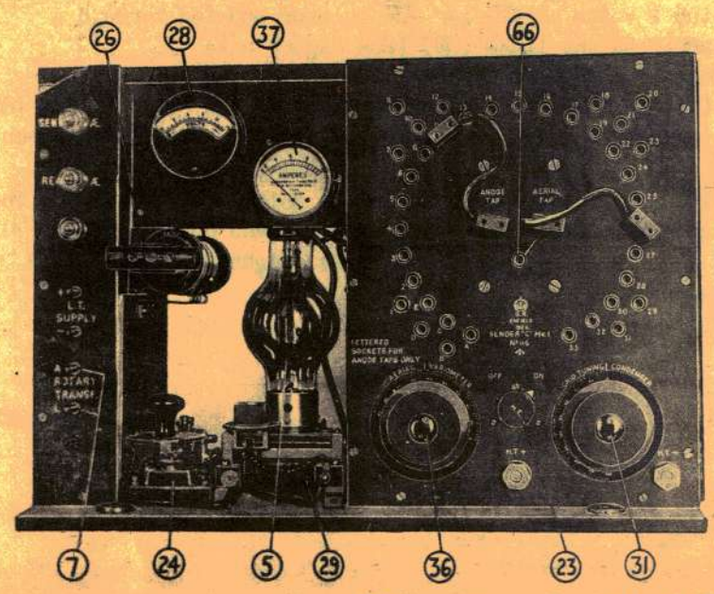


FIG. d.

QB4

TYPE 30

RECEIVER

Frequency range:- 75 - 2000 kc/s (I.C.W.) 75 - 500 kc/s (C.W.)

Valves and method of coupling:- Four AR2

One cumulative grid detector (1), Transformer.
Two A/F amplifiers (2) and (3), Transformer.
One Heterodyne oscillator (4).

The receiver consists of 3 units:-

Tuner (39) Amplifier (40) Heterodyne (41).

Tuner. The tuner (39) comprises a tuned aerial circuit controlled by an inductance (42) with ten tappings and a variable 1.5 jar condenser (43). A switch (44) connects these either in series or parallel. The switch (45) has two positions marked "Stand-by" and "Tune". For searching, when selectivity is not required, the switch is in the stand-by position and connects the aerial circuit directly between grid and filament of the detector valve (1). For increased selectivity, the switch (45) is put to "Tune"; in this position, a closed tuned circuit mutually coupled to the aerial circuit, is connected between grid and filament of the detector valve. The amount of coupling between aerial and closed circuit is adjusted by rotating the coil (42).

The closed circuit consists of the inductance (46) with 5 tappings and a parallel variable tuning condenser (47) of 0.8 jar. A reaction coil (48) is wound on an ebonite former mounted inside the closed circuit inductance (46).

A 0.1 mfd. blocking condenser (49) is placed in the earth lead to prevent a short circuit if the receiver valves are lighted from a tapping of the motor drive battery

Amplifier. The amplifier (40) has a cumulative grid detector valve (1) with reaction and two transformer coupled A/F amplifying valves (2) and (3). The last valve (3) has an output transformer (50), a telephone condenser (51) being connected across the output terminals. Two by-pass condensers are fitted, one (52) across the H.T. battery terminals and the other (53) across the primary of the first transformer (121).

The H.T. is supplied from a 48 volt dry battery (67), and the filament from a 2 volt accumulator fed through a rheostat (54) which also acts as an "ON-OFF" switch. A compartment at the top rear of the receiver case houses the supply leads which are clearly marked.

Heterodyne. The heterodyne consists of a valve oscillator (4) with tuned grid and coupled anode. It may be used either as an oscillator or wavetester, the change from one to the other being carried out by the switch (55) marked Filament. The filament supply to the heterodyne is broken when this switch is centred.

The grid coil (56) which is in two parts is tuned by a 0.8 jar variable condenser (57) and a 0.65 jar fixed condenser (58) (see range switch as described below). The anode coil (59) is mounted inside the grid coil (56). A range switch (60) controls the circuit as follows -

Range 1. Lower half of grid coil (the upper half short circuited) across variable condenser (57).
Range 2. As for 1 but fixed condenser (58) in parallel.
Range 3. Whole grid coil across variable condenser.
Range 4. As for 3 but fixed condenser in parallel.

With the filament switch (55) over to "BUZZ" a 1.5 jar condenser (61) shunted by a 1 megohm leak (62) is inserted in the grid circuit, the effect of this is to produce a "Squegger" action at audible frequency (see Admiralty Handbook of W/T (1931) paragraph 845).

It should be noted that the frequency range of the heterodyne is 75 to 500 kc/s, so, for the frequencies above this covered by the tuner, it is not possible to use the heterodyne unit.

A separate H.T. unit (68) of 18 volts is provided for the heterodyne; the leads clearly marked are brought to the same compartment as the amplifier supply leads.

The filament is supplied from the 2 volts ampplifier accumulator and fed through a rheostat (68) situated on the amplifier panel, to the links (69) (see figure h.).

Tuning and Operation. Set transmitter "Send-Receive" switch (23) to Receive, "Stand-by-Tune" switch (45) to Stand-by, Filament switch (55) to "Buzz". Set heterodyne dial and range switch (60) at desired frequency. Set reaction coil (48) at zero and coupling coil (70) at about 45°. Switch on filaments by rheostats (54) and (68). Adjust aerial circuits for loudest buzzer note. Shift switch (45) to "Tune" and adjust closed circuit for loudest note. Shift switch (55) to "HET". The receiver is now tuned to the required frequency. Adjust reaction coil (48) and coupling coil (70) for desired signal strength. Movement of the coupling coil necessitates slight retuning. The adjustment of the filament rheostats is important.

TYPE 30
RECEIVER (CONT).

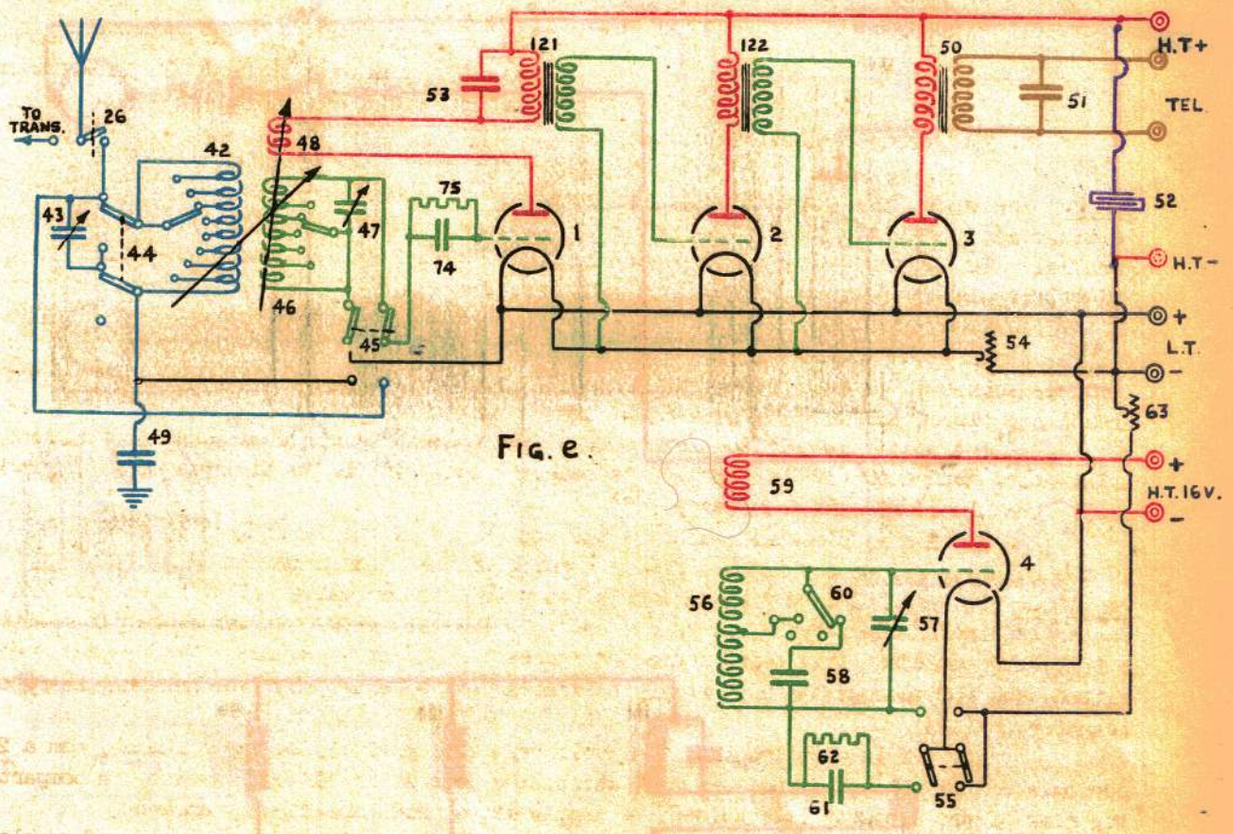


Fig. e.

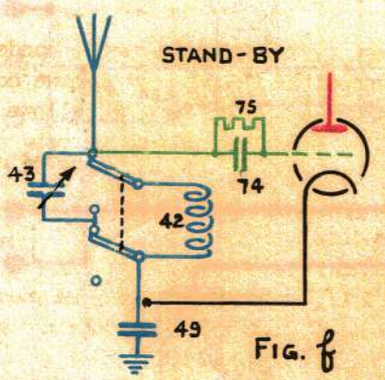


Fig. f

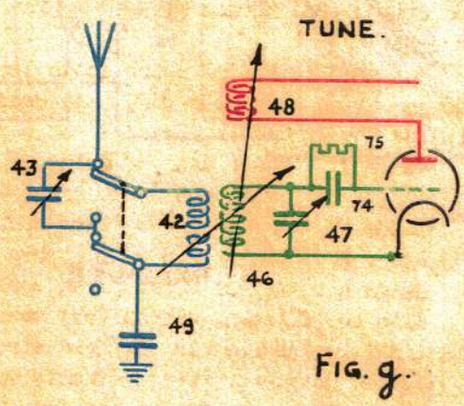


Fig. g.

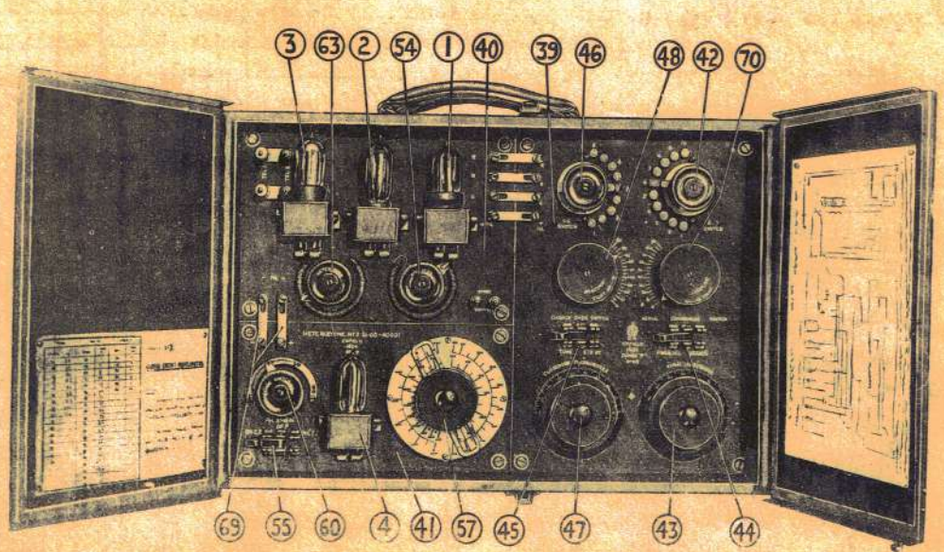


Fig h

TYPE 30

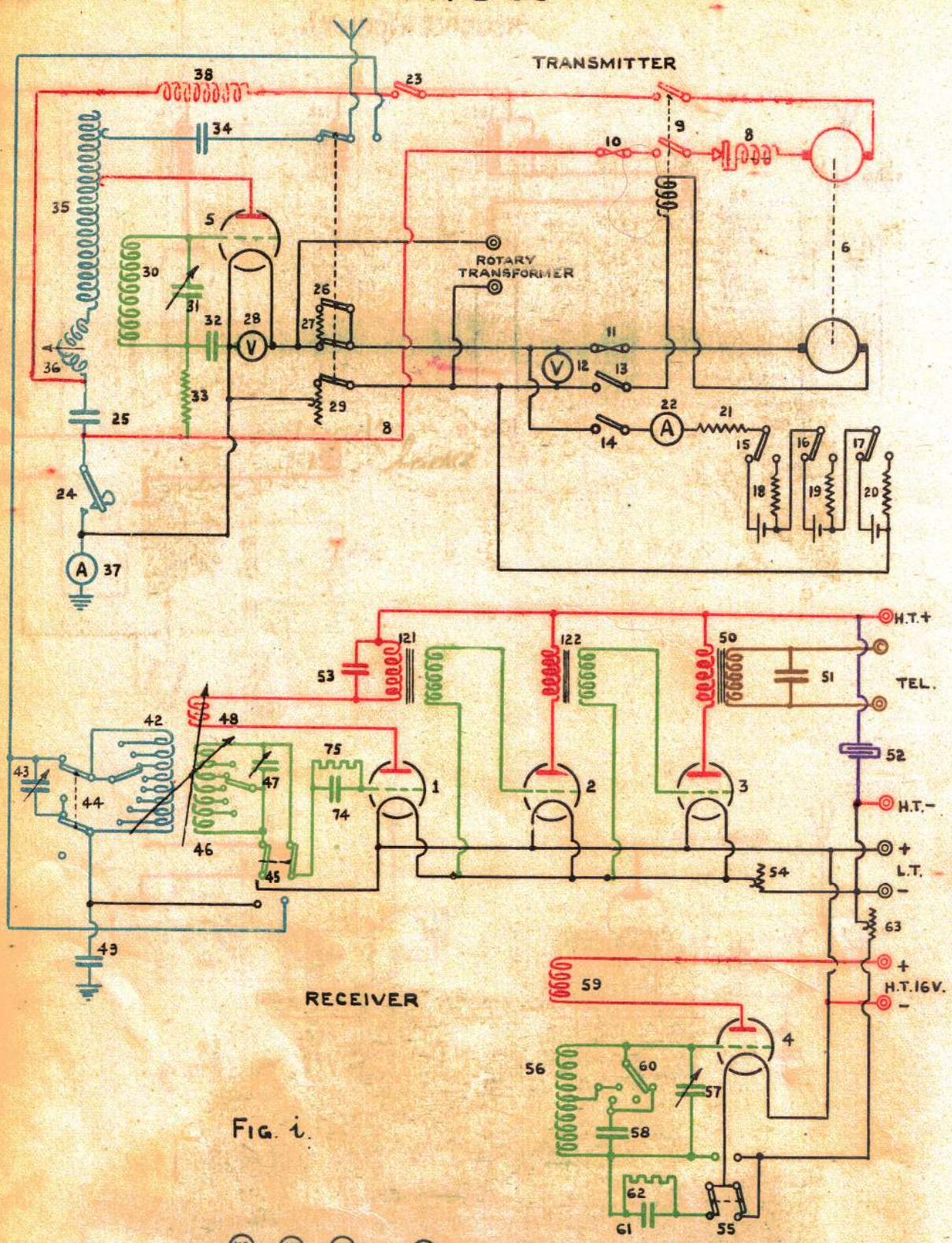


FIG. i.

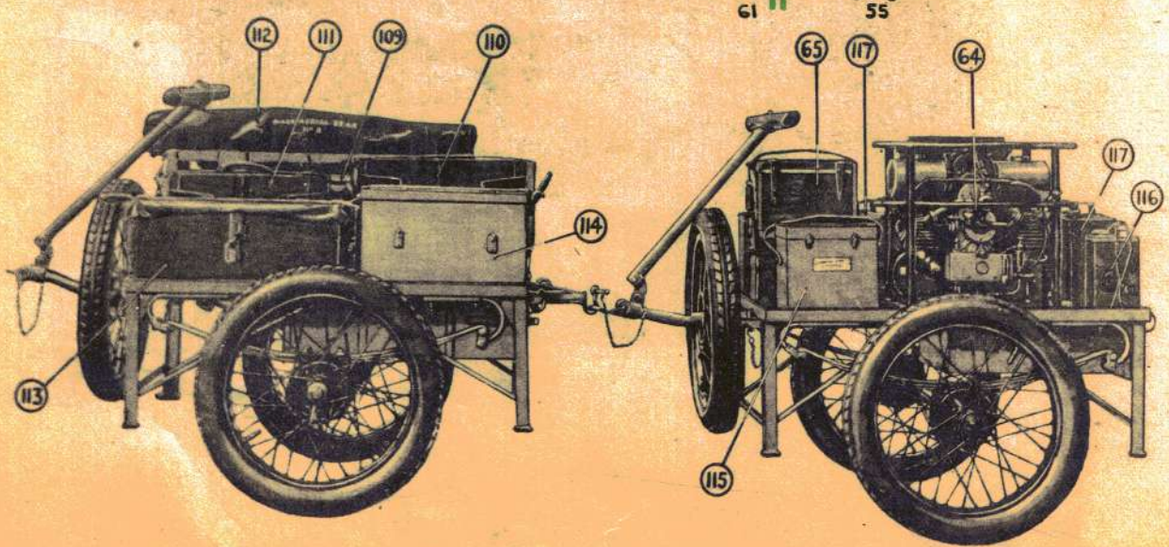
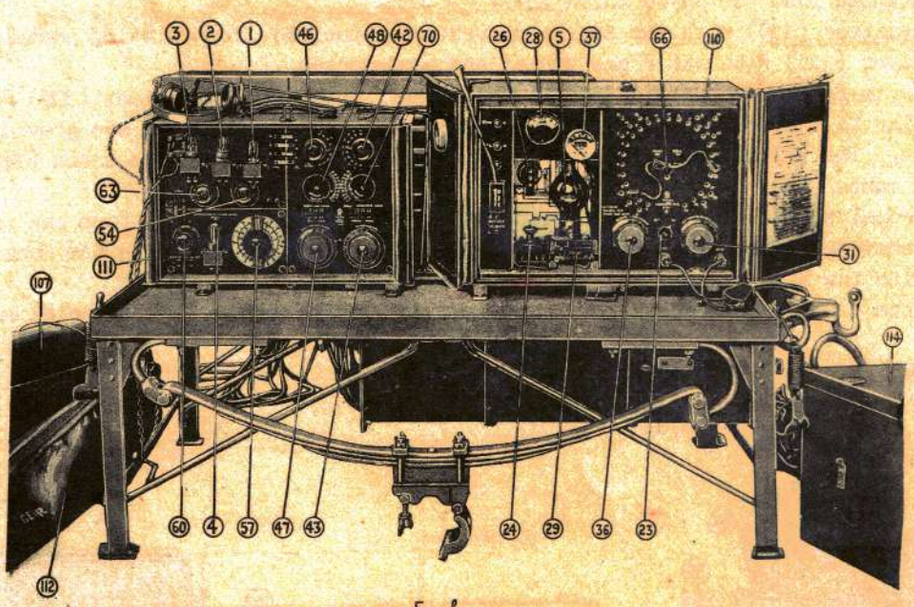


FIG. j


3
2
1
46
48
42
70
26
28
5
37
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110
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107
31
114
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4
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47
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24
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36
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112

Fig k

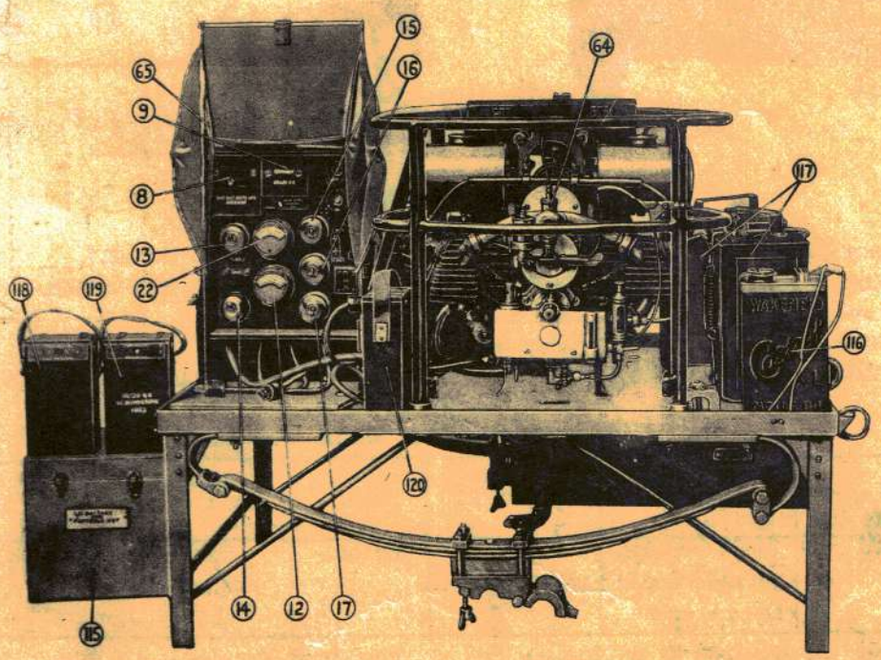
15
16
64
65
9
8
117
13
22
118
119
116
120
14
12
17
115

Fig l

TYPE 30A

150 - 460 Kc/s
C.W. transmitter

Date of design:- 1925.

Type 30A is the name used in the Royal Navy for the Army designed Portable Set C Mark II. It supersedes Type 30. It is transported on a Trojan pyred cart, the wheels and axle of which are made removable so that the cart provides a bench when setting up the receiving station (see figure m.)

The receiver is set up at least 20 yards from the engine to prevent interference, thus dividing the station into two parts which are:-

(a) The transmitter (110) with its engine driven generator (6), transmitting aerial and accessories.

(b) The receiver (111) with its frame aerial and accessories.

The transmitter is remote controlled from the receiver. The aerial equipment (109) for the transmitter is similar to that of Type 30 (see page QB2). Two tents (112)(113) are provided to shelter the instruments. The valves, buzzer units, telephones etc., are carried in a box (115), the transmitting aerial masts (109) in the box (116), and tools in the box (117).

To propel the set along a road with easy gradients, a minimum of four men is required, but with the set removed from the cart and transported in crates as explained in the Book of Instructions issued with the set, six men are necessary at a minimum.

Weights - Complete 1386 lbs; without cart 828 lbs; receiver and batteries only, 56 lbs.

4 men and Cart
6 men on their backs.

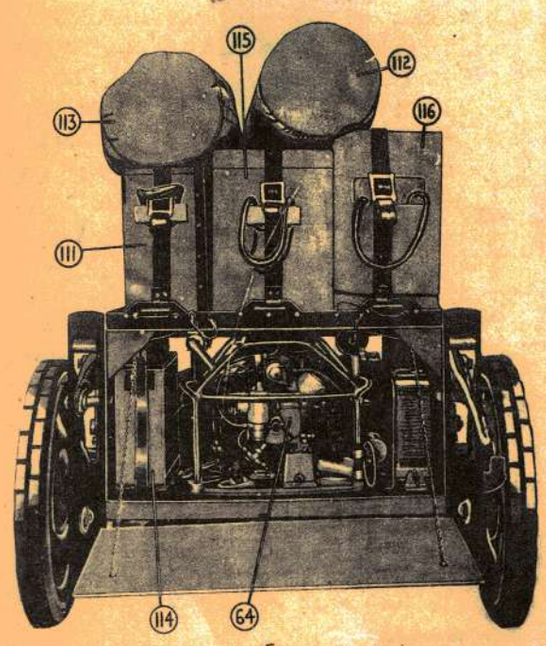

Fig. a.

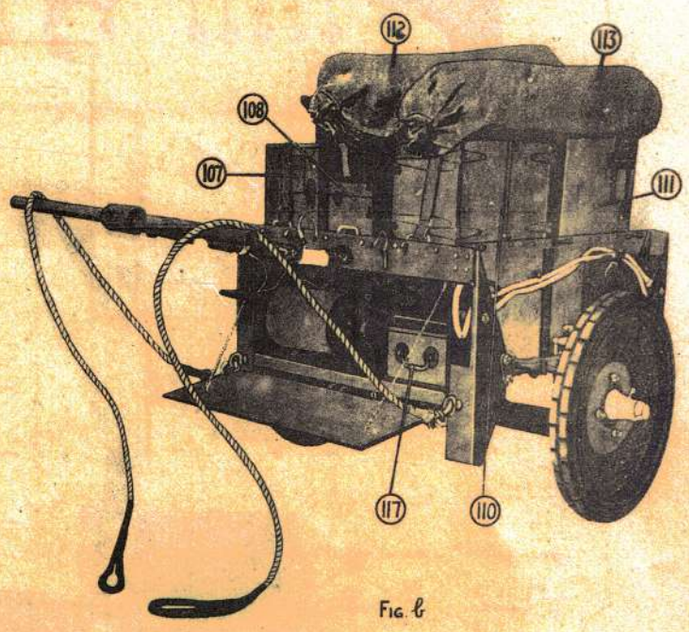

Fig. b

TRANSMITTER

Frequency range:-	150 — 460 kc/s. (with 120 foot aerial).
Power Supply:-	Double purpose generator, H.T. 1200 volts, L.T. 12 volts.
Valve used:-	A.T.50.
Associated wavemeter:-	Army Mark C.
Approximate range in miles:-	With one 36 ft. mast - 40 miles.
	With two 15 ft. masts - 20 miles.
	With two 4 ft. masts - 3 miles.

Wave form	Method of producing oscillation.	Nature of circuit.	Grid excitation.	Feed.	Aerial excitation	High oscillating potential electrode
C.W.	Self.	Tuned circuit between anode and filament.	Mutual inductive.	Series.	Direct inductive.	Anode.

Power Supply. Power is supplied by an engine (64) driven double purpose generator (6)(see figure l.) supplying 1200 volts H.T. and 12 volts L.T. The engine is directly coupled to the generator and both are mounted on a bedplate and frame. The speed of the engine is 1760 revs. per minute automatically controlled by a governor.

H.T. Supply. Permanent leads are fitted to the transmitter for connections to the generator. A switch (28) completes the positive H.T. supply through the anode choke (38), variometer (36) and part of the aerial coil (35) to the anode of the valve (5). A magnetic key (76) is employed for normal working so that the H.T. circuit is entirely confined to the transmitter and generator. A smoothing condenser (25) of 0.5 mfd. is connected across the supply.

TYPE 30A
TRANSMITTER (CONT).

Filament Supply. The filament supply is passed through a rheostat (29) and barretter (72). The barretter, which consists of an iron wire (or wires) mounted in a glass tube containing hydrogen, is fitted to maintain a steady filament supply if the voltage from the generator varies. A voltage rise causes a rise in resistance in the barretter. The valve is thus effectively protected. Joined across the filament supply is the bobbin of the magnetic key (76) and a long twin cable connects the signalling key (24) on the receiver in series with the bobbin.

Oscillatory Circuit. The grid circuit consists of an inductance (30), which is mounted inside the aerial inductance (35) and tuned by a 3 jar variable condenser (31), and a 6000 ohm grid leak (33) and 2 jar grid condenser (32).

The aerial is connected to the aerial inductance (35) through a 5 jar blocking condenser (34). The aerial tap (90) is adjusted by a plug and sockets marked from 1 to 21 on the face of the instrument. A similar plug, and sockets A to D, are provided for the anode tap (91). A special socket (66) is provided for use if it is desired to connect aerial (90) and anode (91) tap at the same point. Fine tuning is carried out on the variometer (36). An aerial ammeter (37) is inserted in the earth lead.

Signalling. The normal signalling key (24) is fitted at the receiving position and a twin 20 yard cable connects it to the transmitter in series with the bobbin of the magnetic key (76). Inserted in the twin cable near the receiver is an R/F separator (102) consisting of two chokes (80)(81) with a 2 mfd. condenser (82) across them. Its duty is to filter out any R/F currents induced into the cable from the transmitting aerial as such currents would cause interference in the receiver. For tuning and testing purposes a morse key (77) is provided on the transmitter. Joined in series with this key is a milliammeter (78) to indicate the anode current. An R/F by-pass condenser (79) is connected across it. The contacts of both the magnetic (76) and morse (77) keys complete the negative H.T. lead and connect the grid circuit to filament.

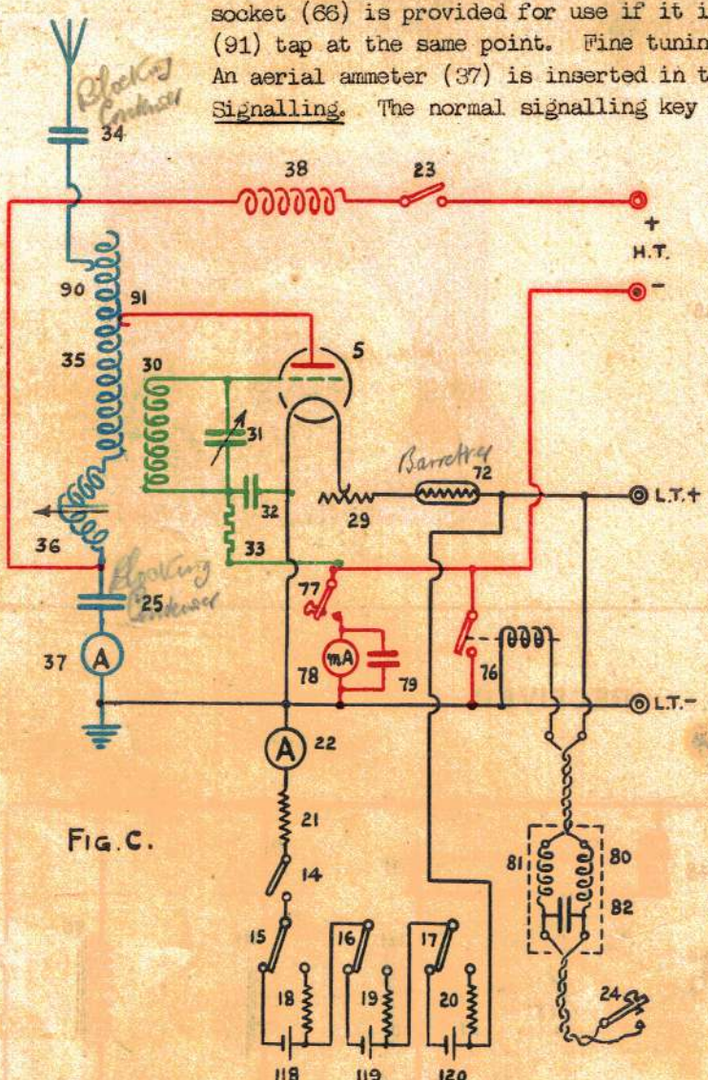

FIG. C.

Charging Circuit. A charging circuit in all respects similar to that of Type 30 (see page QB2) is contained in the transmitter.

Tuning and Operation. Set the filament rheostat (29) to "Resis. in" and the H.T. switch (23) to "OFF". Start the engine; the valve filament should light. Insert aerial and anode taps in approximate positions. Make the H.T. switch (23) to "ON", press key (27) and adjust the grid condenser (31) for maximum aerial current. Adjust the anode tap (91) for maximum radiation and then raise the tap one socket at a time until the aerial current just begins to fall. It is important to keep the anode tap high. Measure the wave by wavemeter (see page QB10) and make the necessary adjustments on the aerial tap (90), readjusting grid condenser (31) as necessary for maximum aerial current. Slight alterations in tuning can be made on the variometer (36). An induction coil (403) is supplied as an emergency transmitter (see Admiralty Handbook of W/T (1931) paragraph 430).

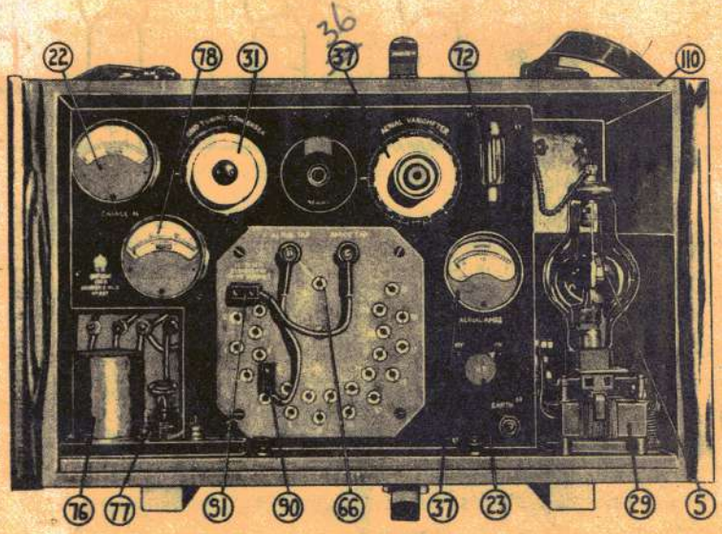

FIG d

QB10

TYPE 30A

ARMY WAVEMETER MARK C

Frequency range:- 125 - 500 kc/s.

The wavemeter (108) is unscreened and employs a simple circuit comprising a variometer (92) and any one of four fixed condensers (93)(94)(95)(96) inserted by the range switch (97). The indicating device is a neon lamp (98) which is protected by a cover having a small hole in the centre. The dial which is marked in metres has four scales and attached to the handle of the variometer is a frame (108) carrying a pointer for each scale. The adjustment of the range switch (97) covers the following frequencies:-

Range 1	125 - 175 kc/s.	Range 3	250 - 355 kc/s.
" 2	175 - 250 kc/s.	" 4	355 - 500 kc/s.

The wavemeter (108) should be placed on top of the transmitter with the dial to the front (see figure 1.) The actual position should be so arranged that the amount of coupling is sufficient to give a glow in the neon lamp over only a very small portion of the scale.

Care should be taken to prevent rough handling or the accuracy of the instrument may be seriously affected.

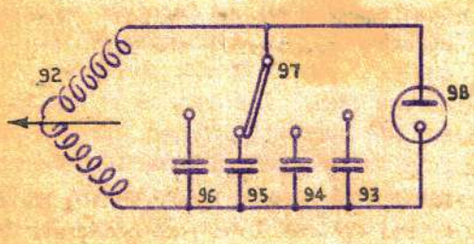

FIG. e.

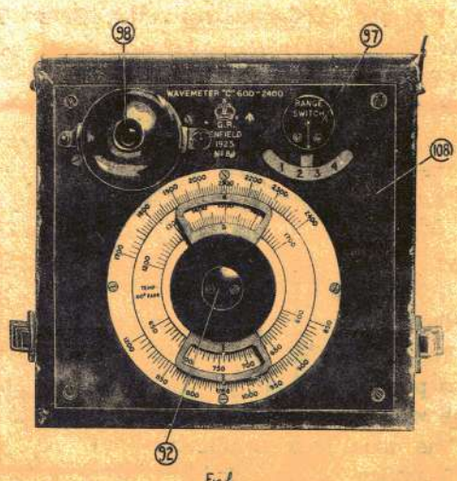

Fig f

RECEIVER

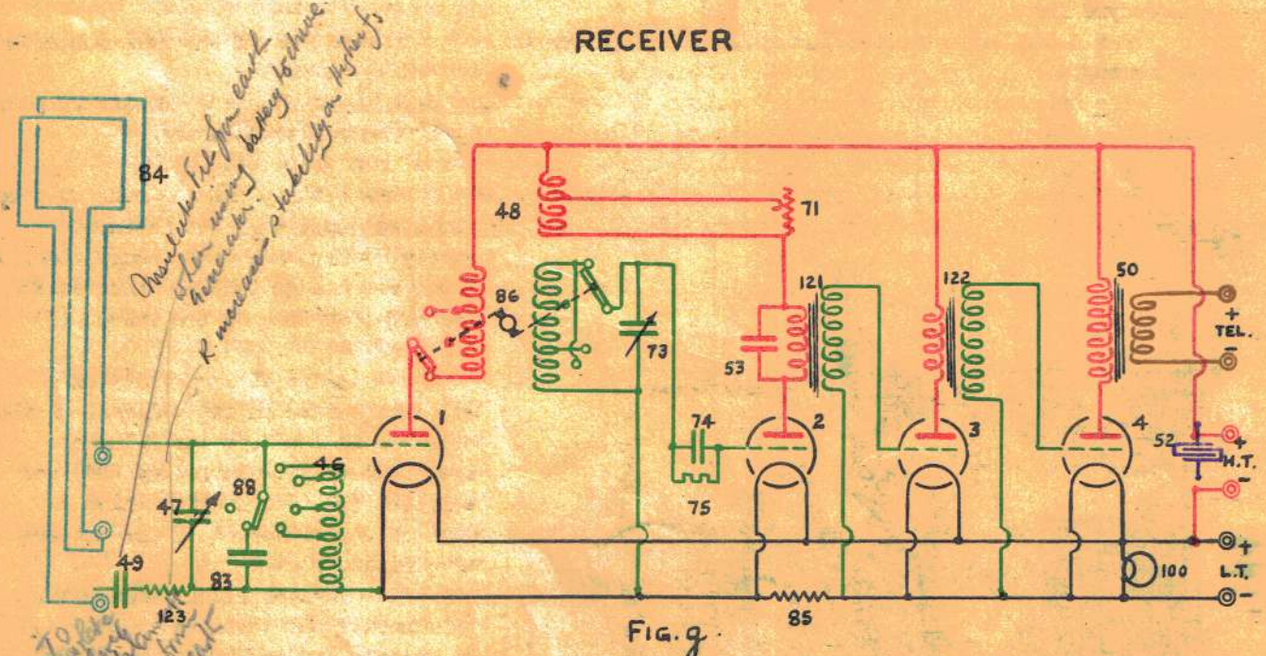

FIG. g.

EQUIVALENT CIRCUIT
FRAME AERIAL.

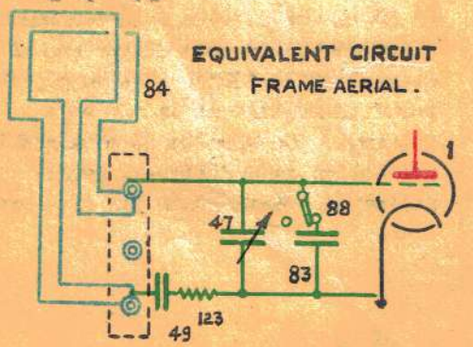

FIG. h.

EQUIVALENT CIRCUIT.
OPEN AERIAL.

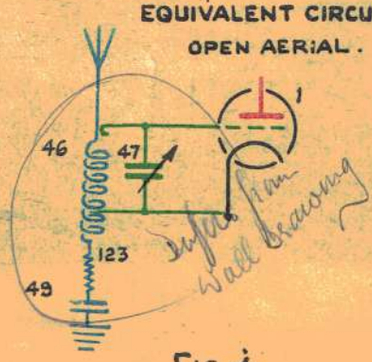

FIG. i

TYPE 30A
RECEIVER

Frequency range:- 65 - 500 kc/s (using frame aerial).
Valves and method of coupling:- Four AR8.
One R/F amplifier (1), Tuned transformer;
One cumulative grid detector (2), Transformer;
Two A/F amplifiers (3) and (4), Transformer.

The receiver is designed for use with a 3 foot frame aerial (84)(see figure m.) comprising two windings which are joined in parallel or series for frequencies above and below 170 kc/s. respectively. An open aerial and earth mat (107)(see figure l.) can be used with the receiver.

The frame aerial (84) is tuned by the 0 - 1.5 jar aerial tuning condenser (47). In position "Frame 2" of the switch (88) a fixed 1.4 jar condenser (83) is connected in parallel with the aerial tuning condenser (47) for use on the lower frequencies. Position "Frame 1" of the switch (88) is a dummy stop for use when employing the aerial condenser (47) only.

When using an open aerial the switch (88) must be put to one of the four positions marked "Open Æ 1, 2, 3, 4". These four positions vary the amount of the coil (46) in circuit, this coil (46) being now the aerial inductance. It is tuned by the aerial tuning condenser (47). This circuit is also the tuned grid circuit of the first valve (1). The 9-jar condenser (49) insulates the filament from earth.

The R/F valve (1) is coupled to the detector valve (2) by a tuned transformer the tappings of both primary and secondary being controlled by the switch (86) marked "Ampfr. Switch". There are three different positions for this switch, marked "1", "2", and "3", which cover the following frequency bands:-

1.	300 - 500	kc/s.
2.	135 - 300	kc/s.
3.	65 - 135	kc/s.

The secondary is tuned by a variable 0.06 jar condenser (78) marked "Ampfr. Tuning Condr."

The dial which is marked in metres has three scales, and the handle of the condenser (78) carries two pointers, one for scales one and two, and the other for scale three. These three scales are for use with the similarly numbered settings of the switch (86).

The usual grid condenser (74) and leak (75) are fitted for cumulative grid detection.

Reaction is provided by the coil (48), and is controlled by an adjustable resistance (71), marked "Reaction" connected across it. With this resistance (71) all in the amount of reaction coupling, which is fixed, is sufficient to maintain self oscillation. The receiver can then be used as an autodyne for C.W. reception.

For I.C.W. or R/T reception it is of course necessary to reduce some of the resistance(71) so that strength of signals is improved without self oscillation taking place.

The detector valve (2) and A/F valves (3) and (4) are transformer coupled. An R/F by-pass condenser (53) is connected across the primary of the detector valve output transformer.

A step down transformer (50) is used in the output of the last valve (4).

H.T. supply is obtained from a 48 volt dry battery (89). This battery has a 2 mfd. by-pass condenser (52) connected across it. A spare H.T. battery (107) is also supplied. The filament supply is from a 2 volt accumulator. A fixed resistance (85) is inserted in the negative lead to the valves (1) and (2).

A 2 volt lamp (100) on a standard fitted on the lid-desk of the receiver is fed from the filament accumulator. The morse key (24) and a holder (87) for a watch which is part of the equipment of the set are also fitted on the lid.

Communication between the transmitter and receiver is provided by a morse key and buzzer unit(104) (105) at the receiver and transmitter. This unit plugs into either end of a special cable (106). The supply for this buzzer circuit is a 4 volt battery. The 4 volts is obtained by connecting an additional 2 volt battery in series with the filament supply.

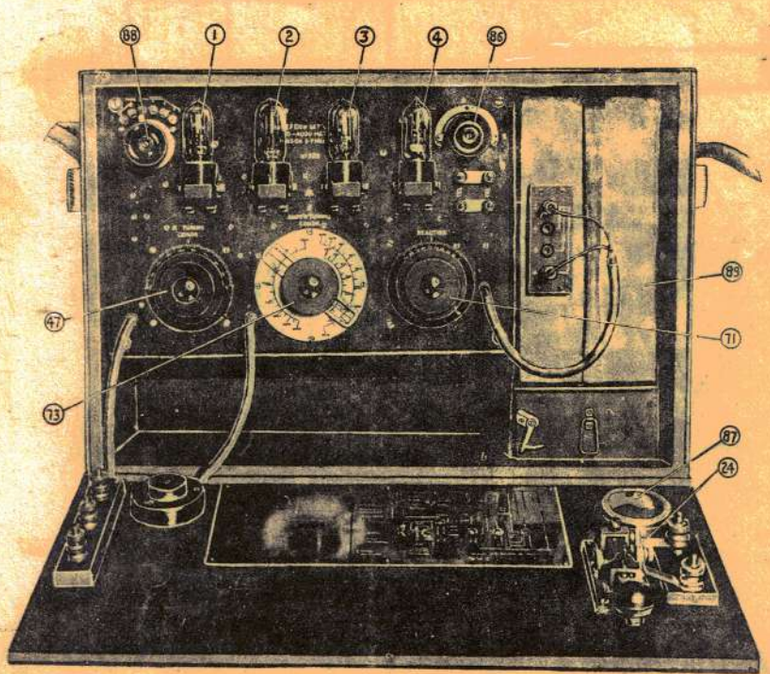

Fig. 4

TYPE 30A

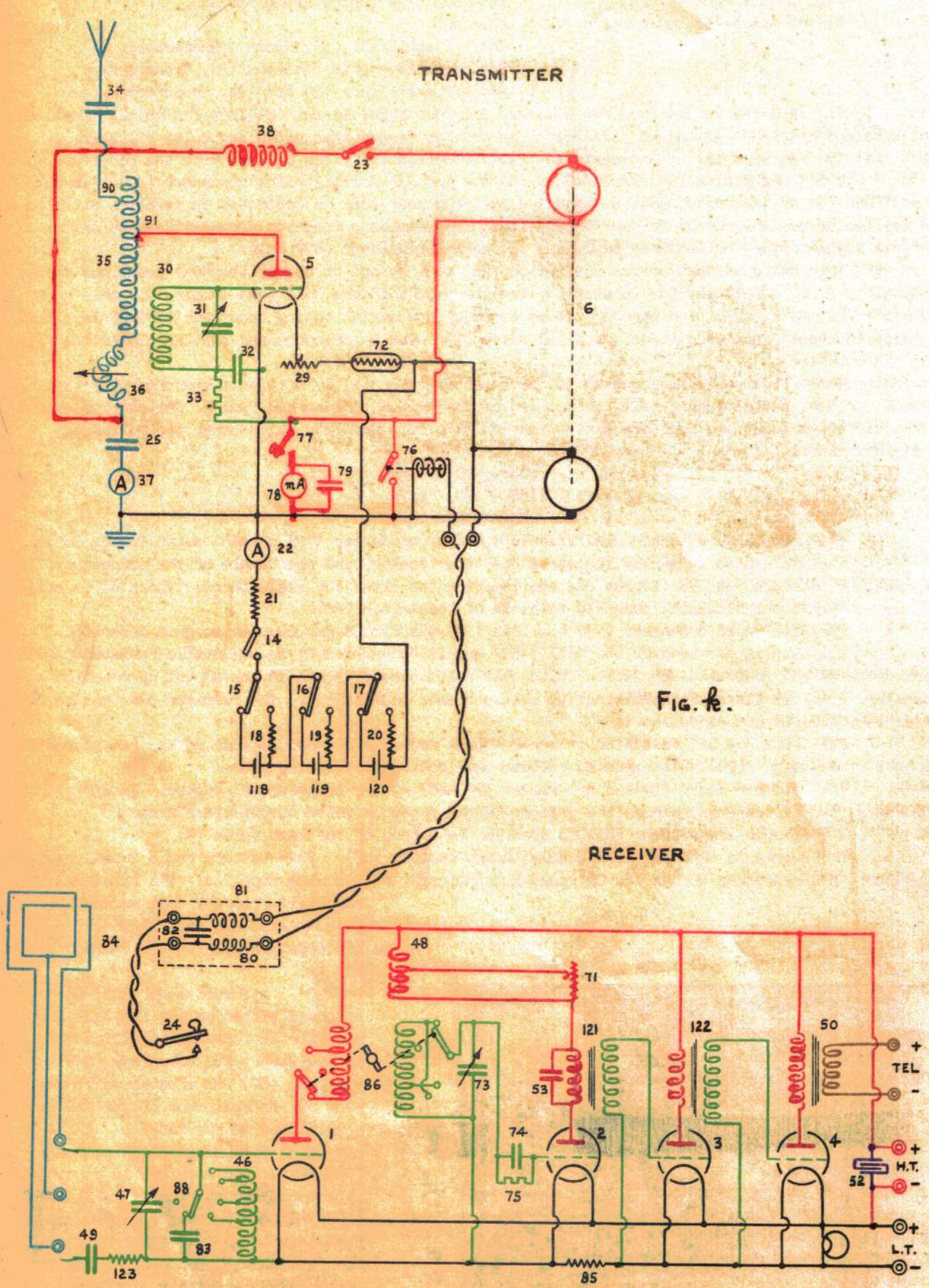

Fig. 4.

TRANSMITTER

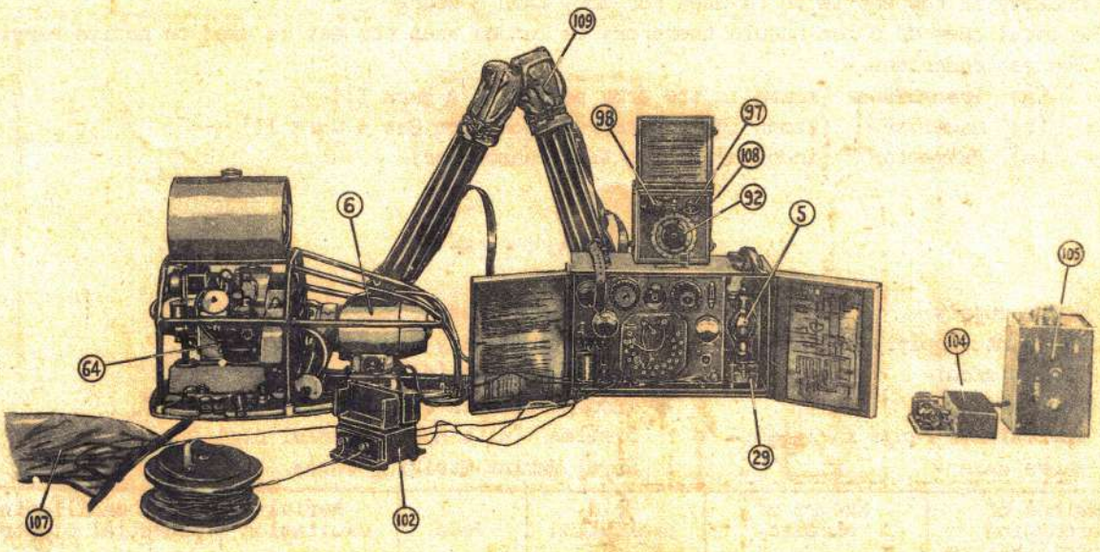

Fig. l.

RECEIVER

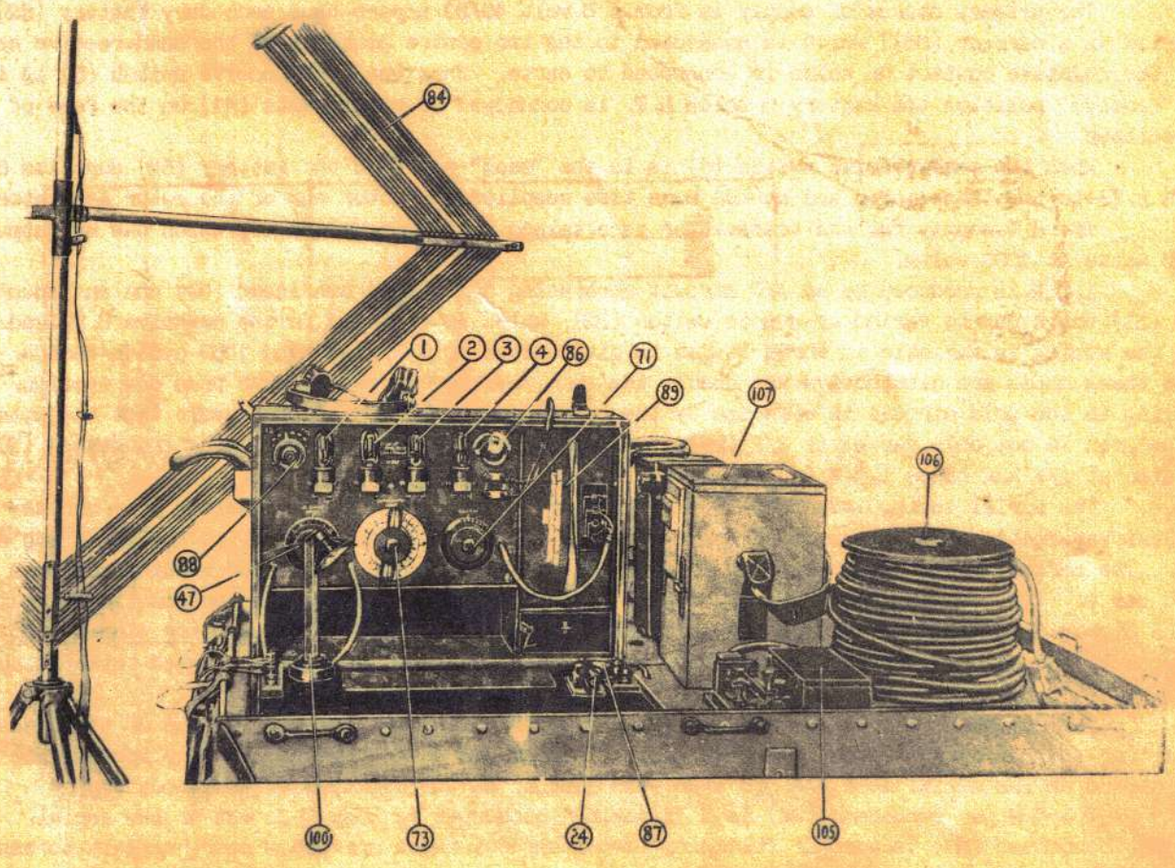

Fig m

TYPE 30P

Date of design:- 1926.
Frequency range:- 750 – 2,000 kc/s.

Type 30P is a small W/T portable set designed by the Army, (under the name of Army Set A Mark II), as a pack set for carriage by three men (see figure j.), or one horse.

The carriers (58)(62)(66) are arranged to allow free movement of the body. Arms and equipment, with the exception of the pack, can therefore be carried at the same time. As the loads weigh about 40 lbs. however, the set can only be carried by the men, under these conditions, for short distances. For ease of transport over long distances two extra men should be detailed to carry the arms and equipment of the whole crew. An additional man is also required to carry a spare secondary battery if the set is to be used for more than 8 hours.

A total crew of 6 men should therefore be landed when the set is used on active service.

The set comprises:-

(a) Transmitter (known in the Army as Sender A Mark II).
(b) Receiver (known in the Army as Reception Set A Mark II).
(c) Wavemeter (incorporated in the Transmitter).

TRANSMITTER

Power supply:- 25 watt generator, 1000 volts (51).
Filament supply:- 6 volt secondary battery (52).
Valves used:- One AT26 valve (4).
Wavemeter:- Incorporated in the Transmitter.
Approximate range in miles:- 5 miles, (with normal aerial rig).
Where used:- Royal Marine Striking Force.

Wave form	Method of producing oscillations.	Nature of circuit	Grid excitation	Feed	Aerial excitation	High oscillating potential electrode
I.C.W.	Self	Tuned circuit between anode and filament.	Mutual inductive	Series	Direct inductive	Anode

The whole of the transmitter, except the 6 volt battery (52), is housed in a single box (55) and can be completely detached from the box by the removal of two small battens (56) which are fastened by thumb screws. A wiring diagram is pasted on the back of the box and a holder (57) for a spare transmitting valve is secured to the inside of the right hand door.

Shoulder fittings (58) with straps on the rear of the box (55) are provided to secure the transmitter to the carrier. The complete transmitter measures 12 x 10 x 14 inches and weighs 37 lbs.

The primary source of supply is from a 6 volt 40/50 ampere-hour secondary battery (52) (carried in a carrier (66)) which is connected to the two centre contacts of the send-receive switch (5), the negative contact of which is connected to earth. When the send-receive switch (5) is in the "receive" position the battery 6 volts L.T. is connected to two sockets (41) on the face of the transmitter.

When the send-receive switch (5) is in the "send" position the battery (52) supplies 6 volts L.T. to the transmitter and at the same time supplies the motor end of the motor generator (51).

The H.T. supply for the transmitter is obtained from this generator, which has an output of 25 watts at 1000 volts.

I.C.W. is produced by an A/F circuit consisting of a fixed condenser (30) and an inductance (31) which can be varied by a note switch (32), which is inserted in the negative H.T. lead. Thus the tuning is variable in three stages to give values of 900, 1100 and 1350 cycles/second. These three notes are distinctive and enable the same wave to be used by more than one station. Coupling to the grid circuit is effected by the coupling coil (36) with the result that the potential of the grid is not only varied at R/F (by mutual induction from the aerial tuning inductance (25)) but also at A/F and hence I.C.W. is produced.

The aerial tuning inductance varies between 36 and 415 mics and consists of a series-parallel variometer. The stator (25) has a variable tap which is brought out to the anode tap switch (53). The aerial circuit includes only 40 turns of the 55 turns on the stator winding, between taps Nos. 1 and 9. The remaining 15 turns are used to obtain the extra high anode tap positions required on the higher frequencies. When in the parallel position (see figure e.) the rotor winding (26) of 48 turns is connected in parallel with 30 turns of the stator winding (25), included between taps 1 and 7.

The handle of the variometer carries a dial engraved with the wavelengths of the transmitter for the respective settings of the handle. These are to be regarded as only approximate as they depend on the aerial used and, to a certain extent, on the position of the anode tap.

The 0.9 jar condenser (24) is a "blocking" condenser to keep D.C. out of the aerial. The 0.3 mf'd. condenser (28) is another "blocking" but is to prevent a short circuit across the H.T. supply.

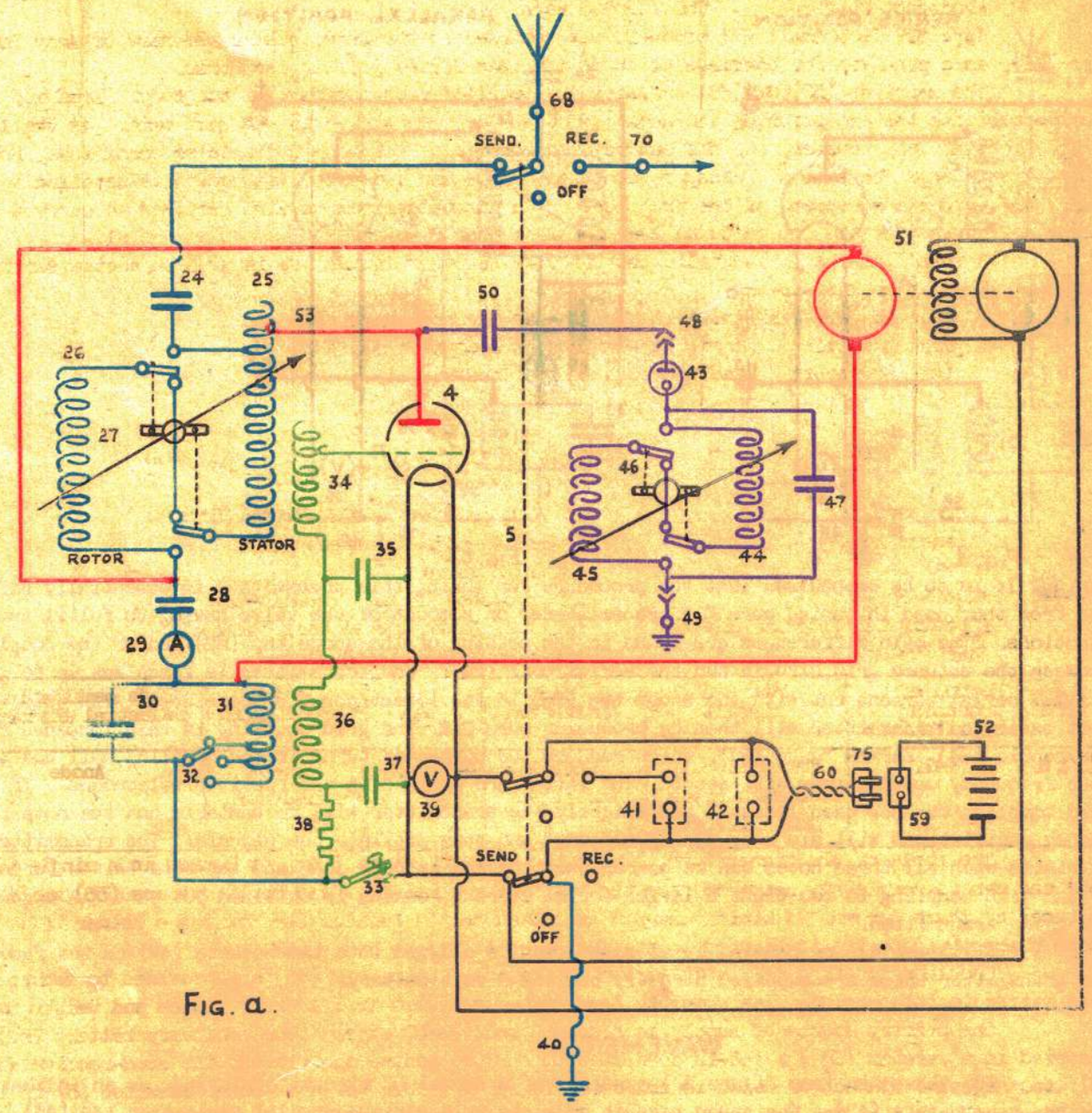

FIG. a.

In the grid circuit the R/F may be assumed to return to the filament via the 45 jar condenser (35) while the A/F is passed by this and the condenser (37) of 1.8 jars.

The signalling key (33) carries out three functions on being pressed:-

(a) Connects the aerial circuit to earth.
(b) Completes the grid leak circuit to filament.
(c) Completes connection between negative L.T. and negative H.T.

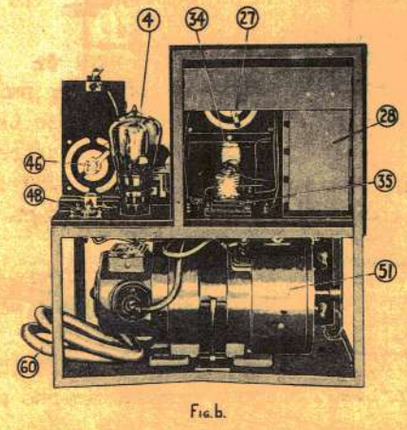

FIG.b.

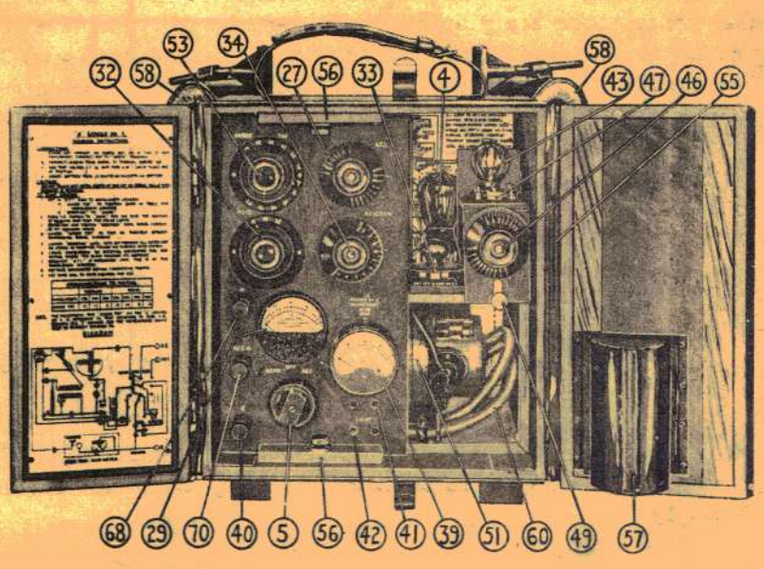

FIG C.

TYPE 30P

EQUIVALENT CIRCUITS.

SERIES POSITION

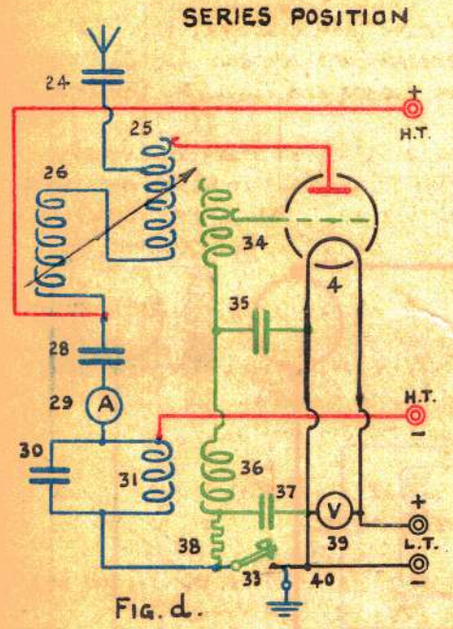

FIG. d.

PARALLEL POSITION

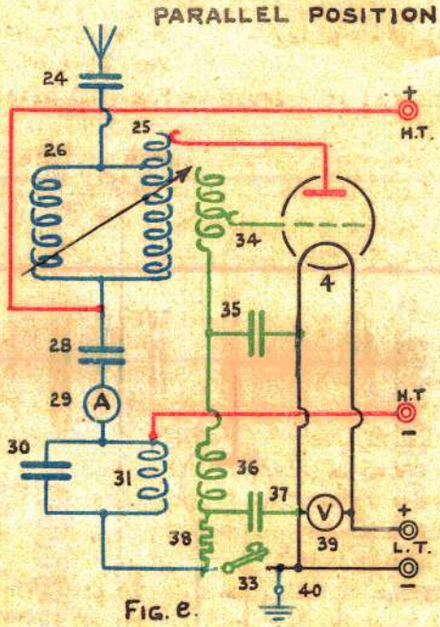

FIG. e.

Tuning. It is to be emphasised that the procedure for tuning this transmitter is essentially different from that used in tuning pure C.W. transmitters, on account of the valve having to fulfil two functions. The main differences are found in the setting of the anode tap (53) and of the coupling between the untuned grid circuit and the aerial coil (25). The transmitter is first set up to give maximum aerial current but with the anode tap (53) in the lowest position consistent with this. In most cases the transmitter will then be producing pure C.W. The grid coupling is then loosened by the handle (34), marked "Reaction", which reduces the number of turns in the coupling coil and the note frequency oscillations will start. The latter are audible in the receiver telephones. If the grid coupling has not been loosened sufficiently the transmitter will be unstable and the note frequency oscillations will die away during a "long" and thus mutilate the signals. The transmitter is stable when all three notes can be heard, when the key is held down and the note switch turned. If the grid coupling is too tight a larger aerial current reading is obtained but pure C.W. signals are being transmitted.

A light (74) for reading by at night, can be plugged into two sockets (42) on the face of the transmitter which are supplied directly off the 6 volt battery.

WAVEMETER

The wavemeter (see figure a.) consists of a normal LC circuit employing, as an indicating device, a neon tube (48). The tuned circuit consists of a series-parallel variometer (44)(45) connected in parallel with a fixed condenser (47). The rotor winding (45) of the variometer is connected in parallel with the stator winding (44) for the higher frequencies and in series with it for the lower frequencies. The inductance varies between 20 and 215 mics.

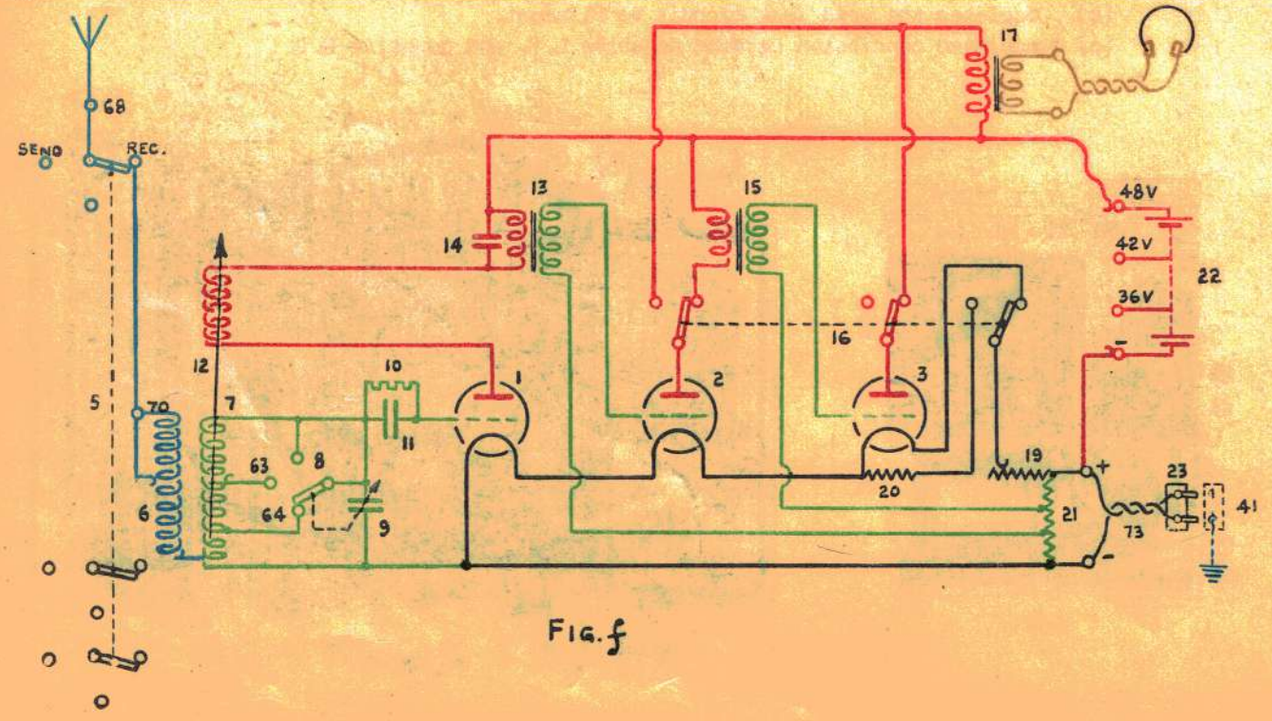

FIG. f

TYPE 30P

RECEIVER

Valves and method of coupling:- Three AR3. One cumulative grid detector, (1).
Two A/F amplifiers, transformer coupled, (2)(3).

The receiver is fitted in a separate box (61) with shoulder straps and fittings, (62)(see figure j.).

The detector (1) employs a circuit loosely coupled to the aerial. This valve is fitted with a reaction coil (12), which can be adjusted to a suitable position to make the receiver oscillate if required to receive C.W., or to operate outside the normal range of the set. Transformer coupling is employed in each stage, the primary of the first transformer (13) having a 1.4 jar condenser(14) across it to by-pass R/F.

Valves (1)(2)(3) are of the two volt type and are connected in series to obtain the correct filament current from the 6 volt battery.

When reducing the number of valves in use from 3 to 2 the action of putting over the change over switch (16) from 3 valves to 2, performs the following functions:-

(a) Connects anode of second valve (2) direct to telephone transformer (17).
(b) Disconnects anode of third valve (3).
(c) Breaks filament circuit to third valve (3) inserting a 5 ohms resistance (20) in the filament circuit instead, to keep the value of filament current constant to the first two valves (1)(2).

A fixed potentiometer of 212 ohms (21) is provided which gives the grids of the second and third valves a negative grid bias of 0.8 volts. The taps on this potentiometer are fixed.

The closed or secondary circuit which is coupled to the aerial comprises a tapped cylindrical coil (7) in parallel with the special tuning condenser (9). The inductances at the taps are 90, 200 and 290 mics approximately.

The spindle of the condenser (9) carries a contact arm, rubbing over three equal segments which are set in to an ebonite plate (see figure g.) at the end of the condenser, connected via three terminals (8)(63)(64) to tappings on the coil (7) which short circuit an increasing number of turns as each makes contact. The condenser is arranged to vary between maximum and minimum capacity at each value of the inductance, i.e., three times in a complete revolution. The maximum value of the condenser (9) is approximately 0.1 jar. The dial behind the pointer of the condenser spindle is calibrated in wavelengths round its periphery.

The telephones (76) are stowed in a pocket on the left hand door and a watch (54) is fitted in a holder which is secured to the right hand door of the box.

To Tune the Receiver. Adjust the reaction handle (12) so that the set oscillates; then search for the distant station by slightly moving the secondary tuning condenser (9). When the distant station is heard adjust the aerial tuning inductance (3) and the secondary tuning condenser (9) and reduce the reaction (12) until the set ceases to oscillate. The musical note of the transmitter should then be audible and any distant stations which may previously have been heard should disappear. It should be noted that when both circuits are properly tuned and the reaction adjusted to its best point, a movement of the aerial tuning inductance switch (3) in either direction will cause the set to oscillate again.

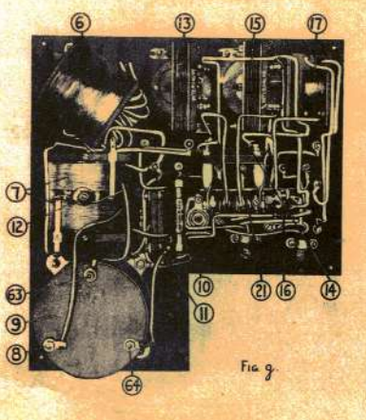

Fig. g.

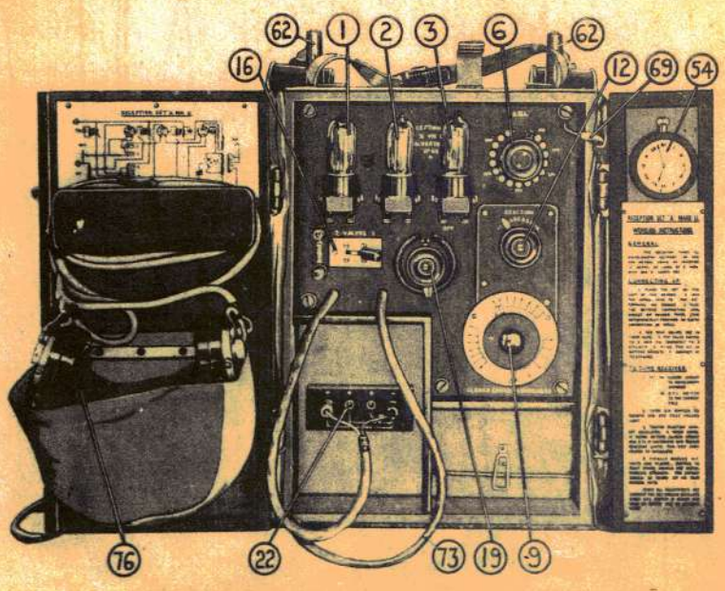

Fig. h.

QB18

TYPE 30P

ERECTION OF THE SET

The site for the aerial and the set should be so chosen that the set can be placed in prolongation of the aerial or nearly so, and the set should be placed at such a distance from the aerial that the feeder (67) is moderately tight. If the feeder is left loose it is liable to sway about near the mast and thus alter the wave frequency.

The aerial consists of a stranded wire 30 feet long on two jointed steel masts. Six 3 foot sections of tubular mast (63), carried in a bag (64) are normally erected as two nine foot masts but this arrangement can be varied (e.g., one mast 12 foot, the other 6 foot, etc.) Again, if additional range is required, the far end of the aerial may be raised on to a tree or pole. Steel pickets and two light stays are used for supporting each mast. One of the masts is provided with an ebonite insulator and this should be placed next to the transmitter. The aerial has a ring at one end which drops over this insulator, and a cord insulator at the other.

The transmitter should be placed in an upright position on the earth mat (65) or if this is not convenient, a wire may be used to connect the earth mat to the "Earth" terminal (40) on the transmitter.

The receiver is placed on the left of the transmitter, and the battery on the right of the instruments. The battery carrier is hinged so that it is not necessary to remove the battery from it in order to work the set.

Connecting Up.

(a) Connect the aerial feeder (67) to AE terminal (68) on the transmitter with the lug turned away from the switches.
(b) Connect the aerial lead (69) on receiver to the appropriate terminal (70) on the transmitter, (marked "REC AE").
(c) Connect the earth mat (65) to terminal marked "E" (40) (figure e.).
(d) Plug battery leads (60) on the transmitter into the sockets on the battery connecting strip (59) by means of the battery plug (75).
(e) Plug the battery leads (73) on the receiver into the appropriate socket (41)(figure f.) on transmitter (marked "REC") by means of the battery plug (23).

Method of Tuning.

(a) Set transmitter "A.T.I." dial (27) to required wave, anode tap (53) to position given in table for required wave frequency and the grid coupling (34) to "Loose".
(b) Switch on and press signalling key (33) and tighten grid coupling (34) until the aerial current is at maximum value.
(c) Lower the anode tap (53) as far as possible without decreasing the aerial current.
(d) Loosen the grid coupling (34) until, with the key pressed, all notes can be heard in receiver phones on turning the note switch (32).
(e) Check the wave frequency by rotating the wavemeter dial (46) and noting where the glow in the neon lamp (43) reaches its maximum.
(f) Readjust the "A.T.I." (27) if necessary until this is at the wave required.
(g) Detune the wavemeter before commencing signalling.
(h) Set note dial (32) to note required.
(i) If the set is in good order the aerial ammeter (29) will show a reading of 0.3 – 0.45 amps on 2000 kc/s and 0.2 – 0.25 amps on 750 kc/s. The wave as measured on the wavemeter should be reasonably near that indicated on the aerial inductance dial.

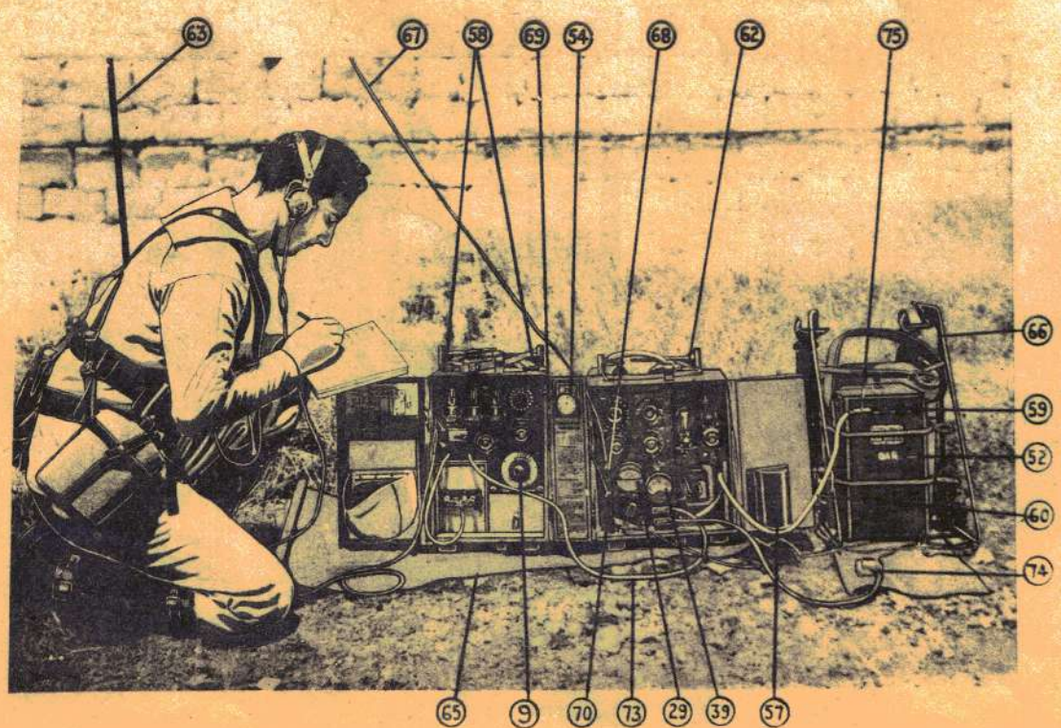

Fig 1.

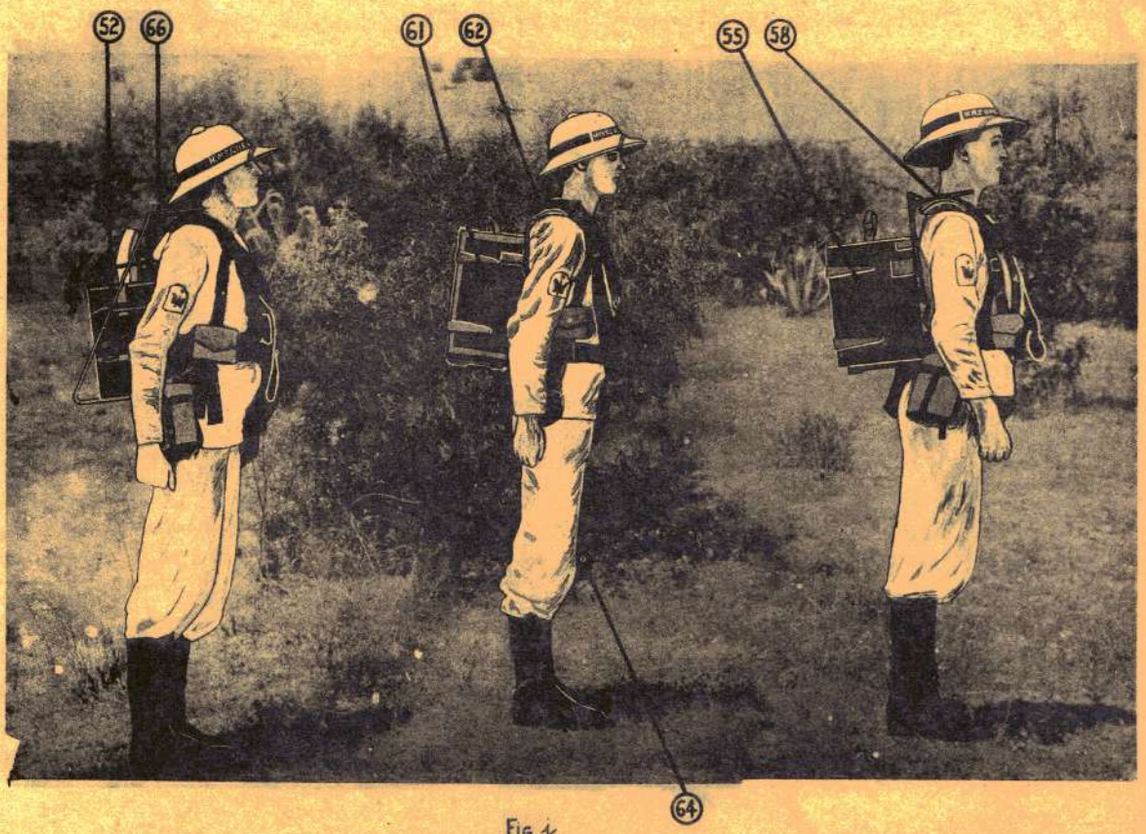

Fig. 7

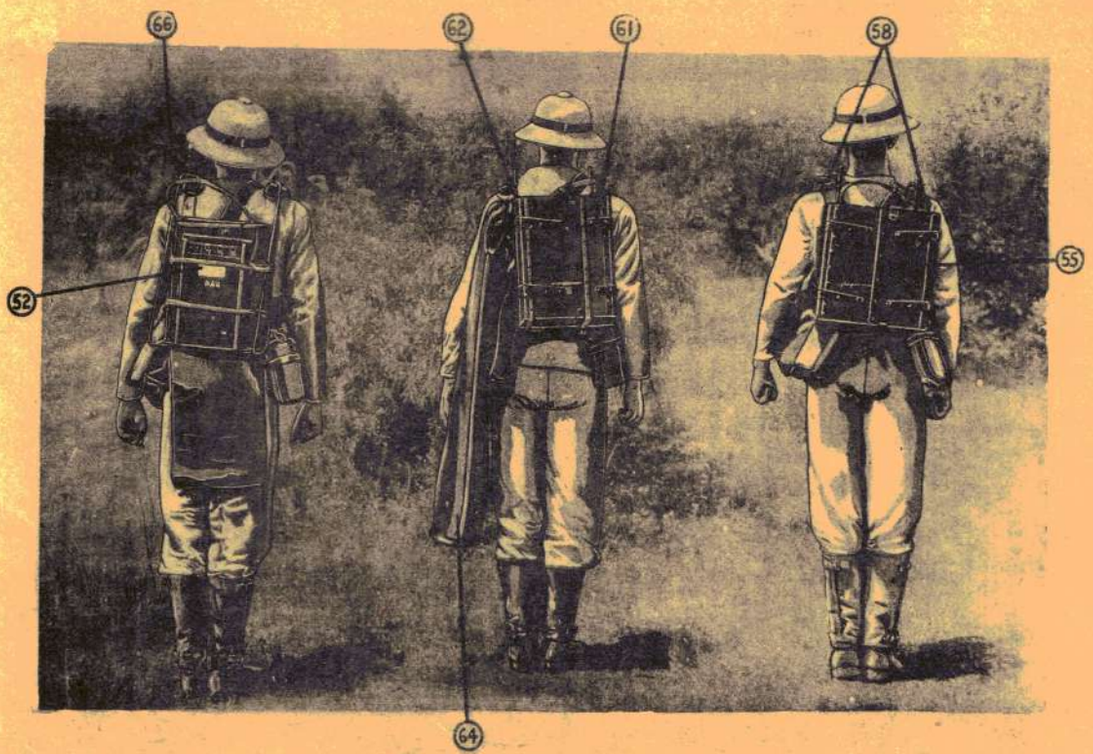

Fig. 8